7 Wind Load calculation

Input Values:

Wind Design Code		ASCE-7 2010	
Wind Load Reduction Scale Factor		0.600	
Basic Wind Speed	[V]	110	Km/hr
Surface Roughness Category		C: Open Terrain	
Importance Factor		1.0	
Type of Surface		Moderately Smooth	
Base Elevation		0	mm.
Percent Wind for Hydrotest		33.0	
Using User defined Wind Press. Vs Elev.		N	
Height of Hill or Escarpment	H or Hh	0	mm.
Distance Upwind of Crest	Lh	0	mm.
Distance from Crest to the Vessel	x	0	mm.
Type of Terrain (Hill, Escarpment)		Flat	
Damping Factor (Beta) for Wind (Ope)		0.0100	
Damping Factor (Beta) for Wind (Empty)		0.0000	
		0.0000	

Basic wind speed (ASCE-7 2010) = 232 km/h
Basic wind speed (INBC 1398) = 120 km/h

Static Gust-Effect Factor, Operating Case [G]:

= min(0.85, 0.925((1 + 1.7 * gQ * Izbar * Q)/(1 + 1.7 * gV * Izbar)))

= min(0.85,0.925((1+1.7*3.4*0.228*0.995)/(1+1.7*3.4*0.228)))

= min(0.85, 0.922)

= 0.850

Natural Frequency of Vessel (Operating)		33.000 Hz
Natural Frequency of Vessel (Empty)		33.000 Hz
Natural Frequency of Vessel (Test)		33.000 Hz
Force Coefficient	[Cf]	0.654
Structure Height to Diameter ratio		16.809

This is classified as a rigid structure. Static analysis performed.

Sample Calculation for the First Element

The ASCE code performs all calculations in Imperial Units only. The wind pressure is therefore computed in these units.

Value of [Alpha] and [Zg]:

Exposure Category: C from Table 26.9.1

Alpha = 9.5: Zg = 274320. mm.

8 ASCE-7 2010:
Seismic Design Category = D
Site classification = C
Fa= 1
Fv= 1.33
Ss= 1.125
S1 = 0.46

:

		ASCE 7-2010
le Factor		0.700
		1.250
		1.000
		1.400
value Ss		1.000
Long Period Acceleration Value Sl		0.400
Moment Reduction Factor Tau		1.000
Force Modification Factor R		3.000
Site Class		C
Component Elevation Ratio	z/h	0.000
Amplification Factor	Ap	0.000
Force Factor		0.000
Consider Vertical Acceleration		No
Minimum Acceleration Multiplier		0.000
User Value of Sds (used if > 0)		0.000
User Value of Sd1 (used if > 0)		0.000

Seismic Analysis Results:

```
Sms = Fa * Ss = 1.0 * 1.0 = 1.0
Sm1 = Fv * S1 = 1.4 * 0.4 = 0.56
Sds = 2/3 * Sms = 2/3 * 1.0 = 0.667
Sd1 = 2/3 * Sm1 = 2/3 * 0.56 = 0.373
```

Check Approximate Fundamental Period from 12.8-7 [Ta]:

```
 = Ct * hn^(x) where Ct = 0.020, x = 0.75 and hn = Structural
Height (ft.)
 = 0.020 * ( 1.9629^(0.75))
 = 0.033 seconds
```

The Coefficient Cu from Table 12.8-1 is : 1.400

Fundamental Period (1/Frequency) [T]:

```
 = ( 1/Natural Frequency ) = ( 1/33.0 )
 = 0.030
```

Check the Value of T which is the smaller of Cu*Ta and T:

```
 = Minimum Value of (1.4 * 0.033, 0.03 ) per 12.8.2
 = 0.030
```

As the time period is < 0.06 second, use section 15.4.2.